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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,897	01/22/2004	Jay S. Burnham	BUR920030110US1	1896
29625	7590	09/19/2005	EXAMINER	
MCGUIRE WOODS LLP 1750 TYSONS BLVD. SUITE 1800 MCLEAN, VA 22102-4215			PRENTY, MARK V	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 09/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/707,897

Applicant(s)

BURNHAM ET AL.

Examiner

MARK PRENTY

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-22 and 24-26 is/are rejected.
- 7) ☒ Claim(s) 14-26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>January 22, 2004</u> . | 6) <input type="checkbox"/> Other: _____ |

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This Office Action is in response to the response filed on September 6, 2005.

The specification is objected to in that "atoms/centimeter" [paragraphs 0032, 0034, 0036, 0046 and 0047] should read, "atoms/cubic centimeter," because such is the parameter of the concentration context. Correction is required.

Independent claim 14 is objected to because [first and second] "dielectric gate" should read, [first and second] "gate dielectric". Correction is required.

Dependent claims 15, 18, 24 and 26 further recite [first and/or second] "dielectric gate" and are thus similarly objected to. Correction is required.

Claim 19 is objected to because "1 8" should read, "18". Correction is required.

Claims 23 and 25 are objected to because "concentration of...atoms/centimeter²" should read, "concentration of...atoms/centimeter³" (because the parameter of concentration is atoms/cubic centimeter). Correction is required.

Claims 24 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, claim 24 is indefinite in reciting that the first concentration of nitrogen is "sufficient to prevent appreciable gate leakage and dopant penetration in the first dielectric gate without causing an appreciable threshold-voltage shift in the first dielectric gate." Similarly, claim 26 is indefinite in reciting that the second concentration of nitrogen is "sufficient to prevent appreciable gate leakage and dopant penetration in the second dielectric gate without causing an appreciable threshold-voltage shift in the second dielectric gate."

Claim 25 depends on claim 24 (not claim 14) and is thus similarly indefinite.

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Claims 14-17, 20 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by United States Patent 6,538,278 to Chau (cited in the Information Disclosure Statement filed on January 22, 2004).

With respect to independent claim 14, Chau discloses a semiconductor structure (see the entire patent, including the Fig. 2 disclosure) comprising: a semiconductor substrate 202; a first active device 210 formed on the substrate, the first active device having a first gate dielectric 220, which has a first concentration of nitrogen; and a second active device 250 formed on the substrate, the second active device having a second gate dielectric gate 260, which has a second concentration of nitrogen different than the first concentration of nitrogen.

Claim 14 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Chau.

With respect to dependent claim 15, Chau's first gate dielectric 220 has a first thickness (20-50 Å – see column 4, lines 40-42) susceptible to appreciable dopant diffusion and current leakage (see the specification at paragraph [0028]); and the second gate dielectric 260 has a second thickness (20-50 Å – see column 5, lines 1-3) susceptible to appreciable dopant diffusion and current leakage (see the specification at paragraph [0028]).

Claim 15 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Chau.

With respect to dependent claim 16, Chau's second concentration of nitrogen (in second gate dielectric 260) is less than the first concentration of nitrogen (in first gate dielectric 220).

Claim 16 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Chau.

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With respect to dependent claim 17, Chau's second active device 250 is a p-channel field effect transistor and the first active device 210 is an n-channel field effect transistor.

Claim 17 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Chau.

With respect to dependent claim 20, Chau's first thickness (of first gate dielectric 220) and second thickness (of second gate dielectric 260) are less than about fifty angstroms (see column 4, lines 40-42, and column 5, lines 1-3).

Claim 20 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Chau.

With respect to dependent claim 22, Chau's first and second concentrations of nitrogen were selectively introduced by one or more processes including one of: rapid thermal nitridation; furnace nitridation, remote plasma nitridation, decoupled plasma nitridation; well implantation; and polysilicon implantation (see Chau's Fig. 4B and Fig. 4D disclosure).

Claim 22 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Chau.

Claims 14, 18, 19 and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by United States Patent 6,690,046 to Beaman et al. (Beaman).

With respect to independent claim 14, Beaman discloses a semiconductor structure (see the entire patent, including the Fig. 7 disclosure) comprising: a semiconductor substrate 16; a first active device 40 formed on the substrate, the first active device having a first gate dielectric 18, which has a first concentration of nitrogen (see column 3, lines 41-42); and a second active device 42 formed on the substrate, the

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second active device having a second gate dielectric gate 24, which has a second concentration of nitrogen (i.e., 0%) different than the first concentration of nitrogen.

Claim 14 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Beaman.

With respect to dependent claim 18, Beaman's first gate dielectric 18 has a first thickness (less than 50 Å thick – see column 3, line 43) susceptible to appreciable dopant diffusion or current leakage (see the specification at paragraph [0028]); and the second gate dielectric 24 has a second thickness (greater than 50 Å thick – see column 5, lines 41-43) not being susceptible to appreciable dopant diffusion or current leakage (see the specification at paragraph [0028]).

Claim 18 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Beaman.

With respect to dependent claim 19, Beaman's second concentration of nitrogen (in second gate dielectric 24) is less than the first concentration of nitrogen (in first gate dielectric 18).

Claim 19 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Beaman.

With respect to dependent claim 21, the first thickness of Beaman's first gate dielectric 18 is less than about fifty angstroms; and the second thickness of Beaman's second gate dielectric 24 is about fifty angstroms or greater (see column 5, lines 37-43).

Claim 21 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Chau.

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Claims 14-16, 20 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by United States Patent 6,821,833 to Chou et al. (Chou).

With respect to independent claim 14, Chou discloses a semiconductor structure (see the entire patent, including the Fig. 5F disclosure) comprising: a semiconductor substrate 12; a first active device PFET formed on the substrate, the first active device having a first gate dielectric 18B, which has a first concentration of nitrogen; and a second active device NFET formed on the substrate, the second active device having a second gate dielectric gate 18C, which has a second concentration of nitrogen different than the first concentration of nitrogen (see column 9, lines

Claim 14 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Chou.

With respect to dependent claim 15, Chou's first gate dielectric 18B has a first thickness (preferably 5-20 Å – see column 7, lines 50-54) susceptible to appreciable dopant diffusion and current leakage (see the specification at paragraph [0028]); and the second gate dielectric 18C has a second thickness (preferably 5-20 Å – see column 7, lines 50-54) susceptible to appreciable dopant diffusion and current leakage (see the specification at paragraph [0028]).

Claim 15 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Chou.

With respect to dependent claim 16, Chou's second concentration of nitrogen (in second gate dielectric 18C) is less than the first concentration of nitrogen (in first gate dielectric 18B). See column 9, lines 43-50.

Claim 16 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Chou.

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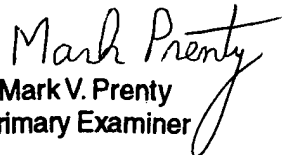
With respect to dependent claim 20, Chou's first thickness (of first gate dielectric 18B) and second thickness (of second gate dielectric 18C) are less than about fifty angstroms (see column 7, lines 50-54).

Claim 20 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Chou.

With respect to dependent claim 22, Chou's first and second concentrations of nitrogen were selectively introduced by one or more processes including one of: rapid thermal nitridation; furnace nitridation, remote plasma nitridation, decoupled plasma nitridation; well implantation; and polysilicon implantation (see Chau's Fig. 5C and Fig. 5E disclosure).

Claim 22 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Chou.

Registered practitioners can telephone the examiner at (571) 272-1843. Any voicemail message left for the examiner must include the name and registration number of the registered practitioner calling, and the Application/Control (Serial) Number. Technology Center 2800's general telephone number is (571) 272-2800.


Mark V. Prenty
Primary Examiner